C1 Exercise 1C (expand and simplify)

Note Title 23/07/2006

1 $9(x-2) \equiv 9x - 18$

$9x - 2 = -18$

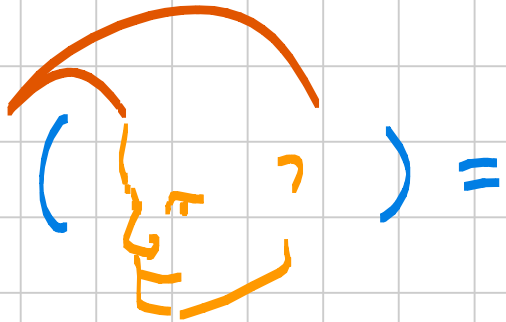
$9 \times x = 9x$

* Use the Elvis' Quiff: $9(x - 2) = 9x - 18$

We met this in C1 Ex1A question 11 onward

C1Ex1C

2 $x(x+9) \equiv x^2 + 9x$



C1Ex1C

3 $-3y(4-3y) \equiv -12y + 9y^2 \equiv 9y^2 - 12y$

$-3y \times 4 = -12y$

$-3y \times -3y = 9y^2$

We agreed in C1Ex1A that we'd put highest powers first unless it helped prevent a leading minus sign. See C1Ex1A questions 2 and 4 in particular.

C1Ex1C

4 $x(y+5) \equiv xy + 5x$

when a term contains two variables, put them in alphabetical order for convenience. That way we all get the same answer.

C1 Ex1C

5 $-x(3x+5)$

Remember $-x$ means $-1 \times x$ so you're multiplying by -1 and x. This will change all plus signs inside the bracket to minus signs and vice-versa

$\equiv -3x^2 - 5x$

C1Ex1C

6 $-5x(4x+1) \equiv -20x^2 - 5x$

C1Ex1C

7 $(4x+5)x \equiv x(4x+5)$

does this look better?
Is it a legitimate switch?
Then you've made progress!
See POLYA'S HEURISTICS

by the COMMUTATIVE rule we learnt earlier
because $ab \equiv ba$ whatever a and b are.

$\equiv 4x^2 + 5x$

C1 Ex 1C

8 $-3y(5-2y^2) \equiv -15y + 6y^3 \equiv 6y^3 - 15y$

$-3y \times 5 \equiv -15y$

$-3y \times -2y^2 \equiv +6y^3$

Be really careful here. A negative value multiplied by another negative value gives a POSITIVE answer.

I've said it before, I'll say it again: minus signs are the most common source of error in competent mathematicians. CHECK THEM!

C1 Ex 1C

9 $-2x(5x-4) \equiv -10x^2 + 8x$

or $\equiv 8x - 10x^2$

if you'd prefer to get rid of that leading minus sign.

Both are cool.

C1 Ex 1C

10 $(3x - 5)x^2 \equiv 3x^3 - 5x^2$

You could use the commutative property to switch it round to get

$x^2(3x - 5)$ if you like, but there's no need.

C1Ex1C

11 $3(x + 2) + (x - 7)$

That Polya trick is waiting for you again:

"How can I make it like one I've done before?"

① Expand ... $\equiv 3x + 6 + x - 7$

② Simplify ... $\equiv 4x - 1$

C1 Ex 1C

12 $5x - 6 - (3x - 2) \equiv 5x - 6 - 3x + 2$

$\equiv 2x - 4$

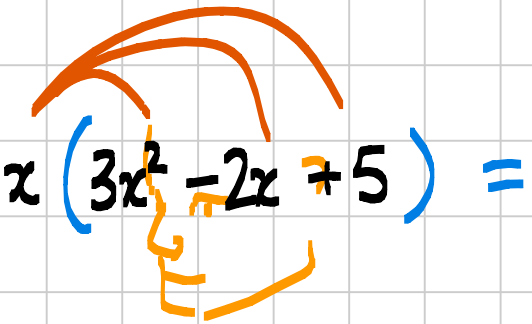
(Don't tell me those minus signs caught you out?
No? Good, I didn't think you were that daft.)

C1Ex1C

13 $x(3x^2 - 2x + 5) \equiv 3x^3 - 2x^2 + 5x$

Another small generalisation here. It doesn't matter how many terms are inside the bracket as long as you multiply EACH ONE by the term outside!

The only real effect is to make Elvis' hairdo even sillier:



C1 Ex 1C

14 $7y^2(2 - 5y + 3y^2) \equiv 14y^2 - 35y^3 + 21y^4$

$\equiv 21y^4 - 35y^3 + 14y^2$

(Arranged in decending powers of y, yeah?)

C1 Ex 1C

15 $-2y^2(5 - 7y + 3y^2) \equiv -10y^2 + 14y^3 - 6y^4$

$\equiv -6y^4 + 14y^3 - 10y^2$

Some of you might have written

$\equiv 14y^3 - 6y^4 - 10y^2$ or similar.

The convention to rearrange to remove a leading minus sign is generally restricted to cases where there are ONLY TWO TERMS: one positive and one negative.

You're unlikely to lose marks either way, but I'll only do it when there are two terms. Please do likewise.

C1 Ex 1C

16 $7(x-2) + 3(x+4) - 6(x-2)$

$\equiv \underline{7x} - 14 \underline{+ 3x} + 12 \underline{- 6x} + 12$

$\equiv 4x + 10$

You might find it helpful to underline matching terms as I have.

C1Ex1C

17 $5x - 3(4 - 2x) + 6 \equiv 5x - 12 + 6x + 6$

$\equiv 11x - 6$

C1Ex1C

18 $3x^2 - x(3 - 4x) + 7 \equiv 3x^2 - 3x + 4x^2 + 7$

$\equiv 7x^2 - 3x + 7$

C1 Ex 1C

19 $4x(x+3) - 2x(3x-7) \equiv 4x^2 + 12x - 6x^2 + 14x$

$\equiv -2x^2 + 26x$

$\equiv 26x - 2x^2$

(Only two terms see, one negative, so switch!)

C1 Ex 1C

20 $3x^2(2x+1) - 5x^2(3x-4)$

$\equiv 6x^3 + 3x^2 - 15x^3 + 20x^2$

$\equiv -9x^3 + 23x^2$

$\equiv 23x^2 - 9x^3$

□